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CONTENTS OF No. 99.

	PAGE
Our Boys at School. By R. A. Proctor	177
The Sun in a Three-Inch Telescope. (*Illus.*) By F.R.A.S.	177
The Fisheries Exhibition. (*Illus.*) By John Ernest Ady	179
Tricycles in 1883: Small *v.* Large Wheels. By John Browning	181
The Birth and Growth of Myth. (*Illus.*) By Edward Clodd	182
Sun Views of Great Britain and the Earth. (*Illus.*) By R. A. Proctor	184
Notes on Punctuation. By R. A. Proctor	186
Sea-Anemones. IV. The Daisy. (*Illus.*) By Thomas Kimber	187
Jack Ketch. By R. A. Proctor	188
Editorial Gossip	189
Reviews: Our American Cousins	190
CORRESPONDENCE: Visual Phenomenon — Colours of Flowers—Wart Charming — Deaf Cats—Letters Received	190
Our Chess Column	190

OUR BOYS AT SCHOOL.

BY RICHARD A. PROCTOR.

OUR youngsters are returning to their schools, where they are to be taught, besides those subjects which appear in school prospectuses, &c., many things which are not so generally mentioned. A lad may be under an Arnold or a Temple, and learn either directly or indirectly from the example and precept of his masters, to be manly and honest, generous, truthful, and brave. If his own nature unfortunately does not predispose him to good, he yet finds himself surrounded by an atmosphere of honesty and generosity, and breathing it is purified and strengthened. But all our boys are not so fortunate. They may be under head-masters who are weak or worse, who let the masters with whom the boys come more into contact be cruel and vindictive, mean, unfair, and false. Men speak of schools often as if their boys were not likely to be injured in character by weak or bad masters. A generous manly boy may escape the evil influences, direct and indirect, which such masters (whether headmasters or not) necessarily exert. But he has to breathe an uncongenial atmosphere. For, where masters are dishonest, a dishonest tone soon begins to prevail among the boys. Honesty is at a discount in such places; dishonesty pays: it is not in human nature, at least in boys' nature that among boys so placed the prevalent tone should not ere long become dishonest.

Fathers should talk to their boys over such matters, not to listen to mere faultfinding, but to find in converse with them what sort of tone prevails among their fellows. Of course with many boys such a course fails. But an honest manly boy, who regards his father as a friend not as "the governor," will very soon show, more clearly than he himself perhaps imagines, the nature of his school surroundings. One does not find that a boy worth anything objects to strict if honest discipline. I know that my own boys talk with enthusiasm of the strictest of the schools at which they have been placed. Go on to talk with them of their school life there, and you presently find that the manly tone of the masters was reflected among the boys. Lying and quibbling, cruelty and treachery took no root in a soil so unsuited to them. A boy that can talk of even punishment as "fair," and of his schoolmates as "good fellows," gives the highest possible praise to the masters of his school, and specially to the headmaster from whom as a rule the rest take their tone. If you send a boy who has been in such a school to one where vindictive ill-tempered and dishonest masters are allowed their own way, where boys are taught by example to give way to their passions, to be treacherous, cruel, and mean, you will very soon learn from him (if you are sensible enough to take interest in his talk of school life) the disgust with which he notes the difference. It is singular, too, how along with falsehood and meanness, impurity and profanity prevail where the tone among the masters is mean or false, where the better sort are outnumbered by the worse and too weak to make a manlier tone prevail. Boys who have been at such a school as I have described above, speak with as much contempt of swearing and foul language, as of sneaking or lying: but all these faults flourish as in a kindred soil, where masters are vindictive and dishonest. This too may sometimes be seen even at schools where *externally* a specially religious tone prevails.

Unfortunately the masters in our schools are not tested or examined at all as to their fitness for the most important part of their work. We know that masters set to teach mathematics, classics, modern languages, and so forth, have a certain degree of familiarity with these subjects; for they have passed certain examinations in them. But we have no means of knowing beforehand that a master who may have chief or sole charge of our boys at school has learned to control his temper as well as to construe Greek and Latin, to teach honesty by his example as effectively as he may be able to deal with mathematical examples on the blackboard, and to be fair and just as well as to be a ready speaker in French and German. Schoolboys are often full of tricks, but chiefly when their masters set them the example. Parents should if possible learn what is the tone among the boys at a school before they send their boys there. Though there can be no public examinations to test this, inquiry among the boys will often disclose a good deal. But if previous inquiry has not been possible, friendly talk with sons about their school life will soon show any one who understands boys' ways the real position of affairs. If there are many "mean fellows" among the boys, fellows who let others be punished for *their* offences, who cringe when they are not bullying and bully when they are not cringing, be sure there is something wrong among the masters. Such evidence is far better than actual complaints of unfairness on the masters' part,—for boys, like men, may complain without cause. But among a given number of boys there will always be a large proportion whose characters take their tone from the masters': they will be among the good fellows if the masters help them that way; but they will sink into the ranks of the bad fellows, (sneaks, bullies, and cowards) if the masters are of that kind.

THE SUN IN A THREE-INCH TELESCOPE.

BY A FELLOW OF THE ROYAL ASTRONOMICAL SOCIETY.

SO far our observations have been all made by night; it now only remains to show what may be done with a three-inch telescope while the sun is above the horizon. Naturally the ruler of our planetary system, our great centre of light and heat, the Sun himself, is the first object

which will invite our attention, and to which our instrument will be directed. Let us see what we may expect to view upon his surface. But here, at the outset, a caution is necessary. On no account whatever must the observer attempt to look at the sun under the same instrumental conditions as he has been viewing the stars. To try to do so without either the interposition of a dark-coloured eye-glass, or the employment of a device to be immediately explained, is almost certain to involve permanent blindness altogether. Sir William Herschel lost an eye in such an attempt; an attempt against which we earnestly warn the student. As a matter of practice, however, opticians send out each astronomical or Huyghenian eye-piece with a dark-glass cap, which must be screwed on whenever the sun is to be looked at directly through the telescope. Should the purchaser of an instrument have his choice of colour in these eye-caps we would recommend very dark green or blue, or else what is known as "London smoke," as the most agreeable tints for use. Red glasses are less liable to crack with the sun's heat, but they are by no means so pleasant to look through. Whatever colour, however, the observer selects, let him take care that it is dark enough; and as dark glasses are, as we have hinted, liable to crack with the sun's heat, means must be taken to diminish that heat as much as possible. This will involve, though, one of two things, either the cutting down of the aperture of the instrument to two inches, or even less, if the observation is likely to be a protracted one; or the turning away the object-glass from the sun at short intervals, should the whole of the object-glass be employed, to give the eye-piece time to cool. There is a device which, should the possessor of a telescope choose to go to the cost of it, enables the sun to be viewed for an almost indefinite period with the whole aperture. In consists simply of a perfectly plane plate of glass placed at an angle of 45° with the axis of the telescope, so as to reflect the image formed by the objective in a direction square to the optical axis. The outside of this plate is ground, so as to destroy any secondary reflection; and, pretty obviously, a very large proportion indeed both of the sun's light and heat, passes through it. The ordinary Huyghenian eye-piece (which may now be covered with a lighter eye-shade) is still employed. Or, finally, we may view the sun without looking *through* our telescope at all; and, for getting a general idea of solar detail, the method we are about to describe is perhaps the best of all. Moreover, it enables half-a-dozen people to view the solar disc at once, if necessary. In this way of using the telescope we convert it into a kind of solar microscope or magic-lantern, and throw the sun's image on to a sheet of very fine, clean, hot-pressed cardboard, which we shift to and from the eye-piece, and move the focussing tube until a sharp and distinct image of the sun is obtained. It will be necessary to have a large sheet of pasteboard covered with black paper, through a hole in the middle of which the eye-piece comes, in order to shield the card on which the image is projected from direct sunlight. The same end would be more perfectly attained by passing the object-end of the telescope through an aperture in the shutter of a completely darkened room; but this is rather too elaborate an arrangement for the ordinary observer. Where only one person wishes to see the sun at a time the receiving disc may be fastened at the bottom of a pasteboard cone fitting over the eye-end of the telescope, and with an aperture cut in the side to look through. An arrangement of this sort is illustrated on p. 136 of the "Lessons in Rudimentary Astronomy," by the Editor of Knowledge, published by Cassell & Co. (Limited). Whichever of these ways we select to view the sun in, we shall be struck by three or four salient features of his surface. The first thing we shall note is that the limb or edge of the sun is perceptibly darker than the middle of his disc, which gradually shades off as we approach his circular outline. The effect of rotundity which this gives to his image is very striking. A little consideration will show that this must be the effect of an atmosphere surrounding what is technically called the photosphere, or light-radiating surface of the sun. The next thing that will arrest our attention—perhaps just now the first—will be the dark spots which diversify the sun's face.

Fig. 1.—Spot on Sun, Sept. 12, 1883, 11.25 a.m.

The above figure may serve as an illustration of an individual single spot, and was drawn with a power of 80, on Wednesday, September 12, at 11.25 a.m. It will be seen to consist of two well-distinguished parts, a dark interior one, known technically as the Umbra (three of these umbræ at least will be observed to be included in the penumbra in the sketch above), surrounded by a lighter fringing which is called the Penumbra. By the use of a peculiarly constructed eye-piece, and a telescope of considerable aperture, the late Mr. Dawes discovered black spots within all large umbræ, and even some small ones. If the observer knows exactly what to look for he may sometimes pick these up even with a 3-inch telescope. It will, however, be necessary to cover the diaphragm in the eye-piece with a circular disc of glazed visiting card (with the glazed side towards the field-glass) centrally perforated with a minute hole made with a fine red-hot needle. The telescope is moved until the spot occupies this exceedingly circumscribed field; and thus cut off from the surrounding glare, the nucleus may often be detected. We have so far spoken as though spots were isolated, but they perhaps most frequently appear in groups, involving the most enormous areas on the sun's surface, of the disturbances of which they are the outward and visible sign.

Our next figure represents a group of spots visible on the sun at 9.50 a.m. on June 30th of the present year, and was drawn, like every other figure illustrating this series of

Fig. 2.—Group of Spots, June 30, 9.50 a.m. (visible to the naked eye).

papers, at the telescope. As a reflecting eye-piece was used in this particular case, though, everything is turned right for left in the engraving. It will be noted how the curves of the penumbræ connected the umbræ. Micrometrical measurement made immediately after our sketch

gave the superficial area of the left-hand group as 762,940,200 square miles, and that of the right-hand one 1,074,370,000 square miles, or, in all, 1,837,310,200 square miles of the sun's surface, as involved in this stupendous disturbance alone! It could be seen with the naked eye when defended by a darkened or smoked glass. There were other spots on the sun's disc at the time. Careful study of the spots under the most favourable definitions will reveal certain striking features. The umbræ, under ordinary circumstances, seem to be black; but the student who has the opportunity of watching a partial solar eclipse, or a transit of Mercury, will at once be struck with the extreme blackness of the moon's limb or of the planet, as contrasted with the (now, by contrast) brown hue of the spots. A distinctly brown, and even orange tinge may often be seen in the images of spots projected on to a sheet of cardboard, in the manner described above. Attentive study of the penumbra will reveal a kind of fimbriated or fringed appearance in it; and it will be further noticed to be darkest at its outer edge, and seemingly to get lighter as it approaches the umbra. Returning now to the limb, or edge of the sun, which, as we have previously said, will be perceived to be notably darker than the centre of his disc, we shall find the shading diversified by curious and often rather complicated streaks of light. These are called "faculæ," and are most numerous and conspicuous about spots which are close to the limb, or where such spots are about to break out. We have sometimes traced faculæ for some considerable distance on to the brighter part of the sun's disc; but, as a rule, they are only seen near the limb. The sketch which follows represents a group of faculæ which was visible on the morning of Aug. 25, at 9 h. 40 min.:—

Fig. 3.—Faculæ on Sun's limb, Aug. 25, 1883, 9.40 a.m.

It was drawn on the paper on to which the image of the sun was projected, in the manner previously described. The fourth piece of solar detail of which we need here speak is the mottling or graining of his surface. This is best caught by shifting the telescope a little, so as to make the sun's image move about in the field. If this be done, the eye will soon receive the impression of a roughness or grain upon the sun's face, akin to that of a piece of magnified loaf-sugar. In large instruments this is seen under the best definition to consist of markings which have, not unaptly, been compared to rice grains, but its resolution into these appearances is wholly beyond our instrumental power.

Such are the leading features observable on the surface of the sun with the means at our disposal. Mutatis mutandis, we may say, as we did concerning the moon, that we are not writing a heliographical treatise; and hence, for their interpretation, must refer the reader to "The Sun," by the Editor of this Journal, or to the volume of the "International Scientific Series," bearing the same title, by Professor Young. We have simply essayed—not, we trust, wholly without success—to indicate what may be seen upon the sun in a three-inch telescope. By the aid of Browning's star spectroscope, with a very narrow slit, the spectra of prominences (those huge uprushes of hydrogen gas known as the "red flames" which are seen during a total solar eclipse) may often be detected on the sun's limb, even in a telescope of the size of that whose use is presupposed; but the mention of the fact must suffice here.

THE FISHERIES EXHIBITION.

By John Ernest Ady.

VII.

AMONGST the numerous exhibits which bear upon our subject, there are perhaps few which call for more attention than those concerned with the supply of water for domestic use.

On the left-hand side of the passage leading to the aquarium gallery, a remarkable filter is being exhibited by Mr. P. A. Maignen, called the "Filtre Rapide." For simplicity in design and efficient working qualities, this filter deserves some notice in these columns, especially as a short description may bring a very useful article within easy reach of many of our readers. In Fig. 16, two sectional diagrams are given of this apparatus. The explanation under the figures will suffice to convey an idea of their structure, which shows that the filter itself consists of movable pieces, which can thus be thoroughly cleansed and replaced with very little trouble, and at a merely nominal expense; the cleansing process, moreover, need not be repeated oftener than once during the course of about three months.

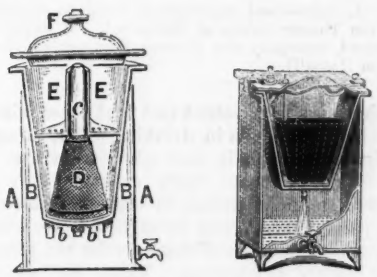


Fig. 16.—Sectional Views of Maignen's "Filtre Rapide."—A, reservoir for the filtered water; B, the filter case, which is removable; D, conical sac of asbestos cloth tied over the filtering frame, which consists of a funnel-shape perforated piece with outlet, *bb'*, and aërating pipe, C. On the outside of the asbestos cloth a charge of powdered "carbo-calcis" is deposited, by being mixed with the first water run into the filter. This forms a layer on the cloth through which all subsequent water must pass and be purified. E, screen for protecting the filtering medium. The figure to the right-hand side is a different form of the same apparatus.

In the majority of filters now used, two types of construction have invariably been followed, both of which are

more or less open to very serious objections, either on account of their mechanical details, or because they fail after a time to "fulfil their functions" adequately. In the first form of filter just alluded to, the working portion is securely cemented down, and when it requires to be cleansed, an amount of delay and expense is occasioned which is often very disheartening to the unfortunate possessor. The second variety consists either of a solid mass of porous carbon, or other material filled in to produce a dense aggregate through which the water is made to pass. It is obvious that, in these arrangements, there is a tendency for the filters to become "foul" through the accumulation of noxious materials within their porous recesses, which then necessitates a laborious cleansing process.

It is a prevalent notion amongst those who have not paid any attention to the subject, that drinking water harbours countless strange organisms which pass collectively under the name of "animalculæ," very likely for the same reason why Rotifers, Diatoms, and Desmids were classed together with the *Infusoria* by the earlier microscopists. Doubtless this popular belief had its origin in such pictures as Fig. 17, taken from Dr. Hassall's valuable little work on "Food and its Adulterations," as well as from indiscriminate displays of a drop of stagnant water under the microscope at Sunday-school *soirées*, or other delightful heterogeneous gatherings. But, when it is known that these monstrous-looking creatures can be captured from drinking water only after diligent search and by straining oceans of the water, and that only in very ill-conditioned water do they congregate in numbers, much of the ardour and wonderment of the inquiring novice is dispelled, and he feels that he is disappointed because he does not actually swallow a few millions of them with every tumbler-full of water.

Fig. 17.—A, animal and vegetable productions contained in the water of the Thames taken at Richmond. B, organic matter, living and dead, especially the Thames *Paramœcium* and husk of wheat (from Hassall).

Nevertheless, it is a patent fact that these minute forms of life do live and thrive in drinking-water, a fact attested to by Fig. 18, which is also taken from Dr. Hassall's book.* Some of these little creatures are harmless; indeed, they are even useful, in endowing the water with a certain palatable freshness through the gases which they eliminate; but others—and alas! by far the larger proportion—are highly deleterious. Take, for example, the *Paramœcia* in Figs. 17 and 18; they are the invariable concomitants of decaying vegetable matter, and are often accompanied by minuter forms, whose very names, *Bacterium*, *Bacillus*, &c., have recently been associated with the most virulent maladies which "flesh is heir to." Most of them have already been described in these pages by Mr. Slack; we therefore refer the reader to his excellent articles.†

* We are indebted to Mr. Maignen for the use of these figures.

† *Ut supra* June 1st, June 29th, and July 13th, 1883.

Fig. 17 shows, that beside living creatures, water is apt to contain foreign particles of dead matter in various stages of decay, such as the husks and straws of wheat, &c., and inorganic particles—*e.g.*, sand, &c. Whilst mostly harmless in themselves, they afford food and shelter to the more unwelcome living things. At all events, everybody will admit that, taking all these circumstances into consideration, it is desirable to free the water from them by some means, and then to try to render that water palatable. Both of these ends are met by Maignen's filter, which purifies, and at the same time aërates, the water. Although we have seen the exhibitor quaff from a glass of purified

Fig. 18.—A, Water taken from Cistern. *a*, blood-red Annelids; *b*, *Brachionus polyacanthus*; *c*, *Euplotes charon*; *d*, *Paramœcia*; *e*, *Amphileptus*; *f*, *Actinophrys Sol*; *g*, *Actinophrys viridis*; *h*, *Pediastrum Boryanum*; *i*, *Closterium Lunula*; *k*, *Scenedesmus quadricanda*; *l*, *Scenedesmus acutus*; *m*, *Scenedesmus obtusus*; *n*, *Cyclotella operculata*; *o*, *Nitzchia Sigma*; *p*, *Synedra minutissima*; *r*, *Melosira varians*; *s*, Threads of slender fungus; *t*, Minute star-shaped bodies; *v*, Organic and earthy matter. Mag., *a* 12; *h* 100, the rest 200 diameters. B, Water taken from Service Pipe. *e*, *Paramœcia* (2 species); *b*, *Vorticella convallaria*; *c*, *Coleps hirtus*; *d*, *Pandorina Morum*; *e*, *Scenedesmus quadricanda*; *f*, *Navicula Amphisbœna*; *g*, *Navicula sphærophora*; *h*, *Asterionella formosa*; *i*, *Fragilaria Capuoina*; *k*, Brown active sporules; *l*, Stationary green sporules; *m*, Threads of slender fungus; *n*, Organic and earthy matter; *o*, *Anguillula fluvialis*.

sewage which had simply passed through the patent invention, yet we are inclined to advise a previous boiling of the water, to ensure the death of such things as *Bacteria*. The aërating tube, C, Fig. 16, may also be loosely plugged with cotton wool, so that stray germs can be intercepted, and if a cork be fitted into the aperture so prevent aëration, the filtered water we have found to be admirably adapted to the wants of a naturalist's laboratory, where distilled water is not always necessary.

The next series of exhibits which demands our attention is that comprised under the head *Cœlenterata*, with its two principal classes, the *Hydrozoa* and the *Actinozoa*. A *Cœlenterate* animal consists essentially of a sac-like body, the walls of which are primarily composed of two layers, an outer, *ectoderm*, and an inner, *endoderm*. There is generally a radial arrangement of parts, observable chiefly in the tentacles with which nearly all of them are provided; and, although they do not possess any marked nervous system, they are characterised by the presence of "thread cells," or peculiar urticating organs, used as weapons of offence and defence. It will be seen from this definition that they approach very nearly to some of the sponges, and their reproductive processes, both by gemmation and division, as well as in the simpler forms of sexual generation, link the two groups together still more closely.

At Stand 756, a series of microscopes, under the care of Mr. Bolton, of Birmingham, are invariably supplied with living forms of one of the simplest, and certainly most beautiful, of the *Hydrozoa*—viz., *Hydra viridis*, or the fresh-water polype. The little *Hydra* consists of a simple cylindrical green sac-like body, closed at one end, which serves to attach it at the will of the creature to some

foreign object. The other end contains a central aperture, or mouth, which leads into the simple sac-like body cavity; around the mouth a circlet of tentacles, or arm-like hollow slender process, are spread out. Careful examination with a high power of the microscope shows that the wall of the body cavity and of the tentacles, which are cœcal prolongations of that cavity, are composed of two layers of cells, constituting an *ectoderm* and an *endoderm;* and that between these there is the early indication of a third layer, or *mesoderm*, which arises from the basal extremities of the ectodermal cells. This layer is called, after its discoverer, Kleinenberg's *neuro-muscular* layer, because it is supposed that it represents a nascent form of muscular and nervous system combined.

Many very complicated forms of *Hydrozoa*, which include the peculiar plant-like sea-firs (*Sertularida*), and their strange independent reproductive members, termed medusoids, or jelly-fishes, may be seen in bottles of spirit at the extreme corner of the East Quadrant. These specimens are each worthy of a careful description, so exquisitely have they been prepared. We may state here, without fear of any contradiction, that each specimen in the collection from the Zoological Station of Naples is a masterpiece of museum mounting, and we would therefore draw the special attention of students to this section of the Exhibition.

In spite of the extreme variety of form exhibited by the *Hydrozoa*, the primitive sac-like nature of the organism, consisting of two layers, is never wholly disguised, and this fact, which was first generalised by Huxley,* has led that eminent observer to make the following statement:—

"Thus there is a very real and genuine analogy between the adult hydrozoön and the embryonic vertebrate animal; but I need hardly say it by no means justifies the assumption that the Hydrozoa are in any sense arrested developments' of higher organisms. All that can justly be affirmed is, that the hydrozoön travels for a certain distance along the same great highway of development as the higher animal, before it turns off to follow the road which leads to its special destination."†

TRICYCLES IN 1883.

SMALL WHEELS *v.* LARGE WHEELS.

BY JOHN BROWNING,

Chairman of the London Tricycle Club.

"SIGMA" has completely missed my point. He has evidently written under the supposition that I am advocating *theoretically* the construction of tricycles with small wheels, whereas I am showing that three or four years ago I was advocating their use theoretically, while now the most advanced and skilful manufacturers are making them, and the fastest and best riders are adopting them, and having proved my case experimentally, I have only written with the intention of hastening the inevitable revolution; but I am obliged to my friend "Sigma" for giving me the opportunity of making my views clearer on this subject. He has totally misunderstood me, and others may have done the same. He has also completely misrepresented what I have said, though this, I feel sure, he has done unwittingly.

I find "Sigma" accusing me of recommending tricycles which will travel at four or five miles an hour, and, by implication, calling me absurd for doing so. My reply is simply that I have not done so.

I find myself accused also of theorising. I have nowhere referred to theories in my articles, but only given facts, and conclusions which must follow from them.

Next I am told that it is easier to ride a machine with large wheels at seven or eight miles an hour than a machine with 36-inch wheels at the rate of four miles an hour. I reply that "Sigma" has not tried the experiment or he would not say so. *I have, and know it is not.*

"Sigma" supposes that I recommend small wheels because they are easy, though slow. I do so because, as I state, they are *easy and fast.*

The person who begins with one of the small-wheeled machines could, as he wished for more speed, have his machine geared up even to 65 inches if he pleased, at a trifling expense.

This would avoid all the rapid pedalling "Sigma" declaims against.

"Sigma" says the machine he rides has 50-inch wheels, is geared up to 60 inches, and yet weighs only 60 lbs. I reply that if it had wheels 40 inches diameter they might be geared up to 60 inches, and the weight of the machine might be reduced to about 40 lbs., and yet be equally strong and it would be faster.

"Sigma" is an exceptionally strong rider and I am a weak one, but Mr. Nixon, who is a more powerful rider even than himself, will tell him that I gave him the slip in Croydon, not long since, and that he had to ride for half an hour, at the rate of certainly more than ten miles an hour before he could catch me.

Mr. Nixon had 50-in. wheels, and I had 38-in. geared to 48-in.

Had I been riding a machine like his own, Mr. Nixon would have had no trouble in catching me in five minutes.

No one knows better than "Sigma" how much I have the interests of tricyclists at heart. Surely he may trust me *on a mechanical matter* not to mislead them.

The fact that the Coventry "Rotary," one of the fastest machines, has *two* 20-in. wheels on one side is a sufficient proof, if any were required, that small wheels will not prevent a machine from travelling quickly.

Early this year, I had the pleasure of acting as judge in the 100 miles road ride of the London Tricycle Club.

"Sigma" will not be likely to forget this, as, with a disabled hand and foot and a broken machine, the result of an accident only two days before, he won the 100 miles time medal in an exceptionally plucky manner.

The first thirty-six miles of road—from Boston to Peterborough—was so rough that it broke the front wheels of several machines. Rough roads are supposed to be unrideable by small wheels, yet Mr. Arthur Salmon was amongst the first two or three men in, *though he was riding a machine with 42-in. wheels.*

A few weeks ago, Mr. A. Salmon and myself rode 65 miles in a day together. Mr. Salmon rode his 42-inch, geared up, I believe, to 58, I rode my 38-in., geared to 48 in., we stopped about three hours for rest and refreshment, and I was home before eight o'clock in good daylight. I leave "Sigma" to imagine whether our pace was anything like four or five miles an hour.

Not a single remark was made about the smallness of our machines by drivers or others, nor has there been either before or since, and I am sure our Editor will agree that some D.G.N.F. would, if we looked awkward on them, be sure to tell us so. The L.T.C. is strong in chaff as well as riding.

Mr. Salmon is 5 ft. 10 in. at least, and finds 42-in. wheels large enough for him.

In proportion to this, as I am only 5 ft. 4 in., a machine

* Proc. Linn. Soc., 1849.

† "Monograph of the Oceanic Hydrozoa." Ray Society's Publications. 1859.

XUM

with 36 in., which I shall have geared up to 50 in., should be large enough for me, and I shall ride nothing larger than this after this season.

If my friendly antagonist, instead of trying to prove I am wrong—on paper (a hopeless task, though he is so able a writer that he is sure to make out an apparently good case), will use the influence he has to get the manufacturers to make him an Imperial Club, with 40-inch wheels geared to 60 inches to weigh under 45 lb. or 40 lb., if possible, and will try the machine, I am certain he will go no further with his arguments against small wheels.

In the 50 miles Road Ride, which took place last Saturday, Mr. Marriott for the first time used a tricycle which had wheels only 40 inches in diameter. These were geared up to 56 inches, that is, ran as if they were wheels 56 inches in diameter. The machine weighed only a trifle over 46 lb.

Mr. Marriott covered the distance in less time than it has been done on any previous occasion, though the road was hilly and muddy, and the wind very strong against him on returning.

In this ride Mr. Marriott really covered 54 miles in 4 hours 7 minutes, and was unavoidably detained ten minutes, so that the 54 miles were actually ridden in 3 hours 57 minutes on these small wheels.

The future of the tricycle now lies with small-wheel machines. Unfortunately, this is a matter easily misunderstood by those who have not practically experimented on the subject.

Herbert Spencer begins a wonderful series of delusive illustrations thus:—"It stands to reason that salmon will be cheaper in Aberdeen than in London"—which is the reverse of the fact.

Similarly, I would say:—It stands to reason that a large-wheeled tricycle will pass over an obstacle easier than a small one. To make this proposition true, it is necessary to add—*other things being equal.*

But other things are *not* equal in our case, as by using small wheels we get a much smaller and lighter machine, and one that will pass more easily over obstructions than a heavier machine on larger wheels.

"Sigma" altogether ignores the support my views have received from the following authorities:—

Mr. Marriott, one of the first manufacturers and the finest rider of the day, whose letter I have forwarded to the Editor.

Messrs. Nixon and A. Salmon, the two best riders of the London Tricycle Club, and Mr. Percy Letchfour, one of the fastest riders of the Finchley Tricycle Club, *all racing men.* Also Messrs. Salmon, Howard, and Grace.

If, instead of instancing an aged clergyman, with but slender experience, he can quote the names of some well-known riders, who, having tried the new small-wheeled machines, have gone back to large wheels, then he will have gone some way towards proving that I may be wrong.

On one point I can excuse "Sigma" for misunderstanding me; that is, where I intimated that I pretty well agreed with the rough estimate that about one mile in each ten of road will be found unrideable. I did not wish to occupy space by explaining that, by unrideable I did not mean that they cannot actually be ridden, but that *it does not pay to ride them.*

A hill which is just rideable will require the expenditure of more than four times the power to ride it than it will to walk it.

Why do engineers make tunnels for locomotives to run as nearly on a level as possible? Simply because it is a great disadvantage to have to mount steep inclines on wheels.

THE BIRTH AND GROWTH OF MYTH.

By Edward Clodd.

XVI.

As we have seen, the totem is the clan-name indicating descent from a common ancestor. It is also the clan-symbol, badge, or crest. Where the tribes among whom it is found are still in the picture-writing stage, *i.e.*, when the idea is expressed by a portrait of the thing itself instead of by some sound-sign—a stage in writing corresponding to the primitive stage in language, when words were imitative—there we find the rude hieroglyphic of the totem a means of intercourse between different tribes, as well as with whites. A striking example of this is given in the sketch (Fig. 1), which is a copy of a petition sent by some Western Indian tribes to the United States Congress for the right to fish in certain small lakes near Lake Superior.

The bird represents the leading clan, the crane; then follow three martens, as totems of three tribes; then the bear, the man-fish, and the cat-fish, also totems. From the eye and heart of each of the animals runs a line connecting them with the eye and heart of the crane, to show that they are all of one mind, and the eye of the crane has also a line connecting it with the lakes on which the tribes have their eyes, and another line running towards Congress.

In the barbaric custom of painting or carving the totem on oars, on the bows and sides of canoes, on weapons, on pillars in the front of houses, and on the houses themselves; in tattooing it on various parts of the body (in the latter case, in some instances, together with pictures of exploits; so that the man carries on his person an illustrated history of his own life) we have the remote and forgotten origin of heraldic emblems. The symbols of civilised nations, as, *e.g.*, the Imperial eagle, which so many states of ancient and modern renown have chosen; the crests of families of rank, with their fabulous monsters, as the cherub, the Greek *gryps*, surviving in the griffin, the dragon, the unicorn, which, born of rude fancy or terrified imagination, are now carved on the entrance-gates to the houses of the great; the armorial bearings on carriages; the crest engraven on ring or embossed on writing-paper, these are the lineal descendants of the totem; and the Indians, who could see no difference between their system of manitous and those of the white people, with their spread-eagle or their lion-rampant, made a shrewd guess that would not occur to many a *parvenu* applying at the Heralds' College for a crest. The continuity is traceable in the custom of the Mexicans and other civilised nations of painting the totemic animals on their banners, flags, crests, and other insignia; and it would seem that we have in the totem the key to the mystery of those huge animal-shaped mounds which abound on the North American continent.

The arbitrary selection in the "ages of chivalry" of such arms as pleased the knightly fancy, or ministered to its pride, or, as was often the case, resembled the name in sound, together with the ignorance then and till recently existing as to the origin of crests, and also the discredit into which a seemingly meaningless vanity had fallen, have made it difficult to trace the survival of the totem in the crests even of that numerous company of the Upper Ten who claim descent from warriors who came over with the Conqueror. But there is no doubt that an inquiry conducted on the lines suggested above, and not led into by-paths by false analogies, would yield matter of interest and value. It would add to the evidence of that common semi-civilised stage out of which we have risen. Such names as the Horsings, the Wylfings, the Derings, the Ravens, the

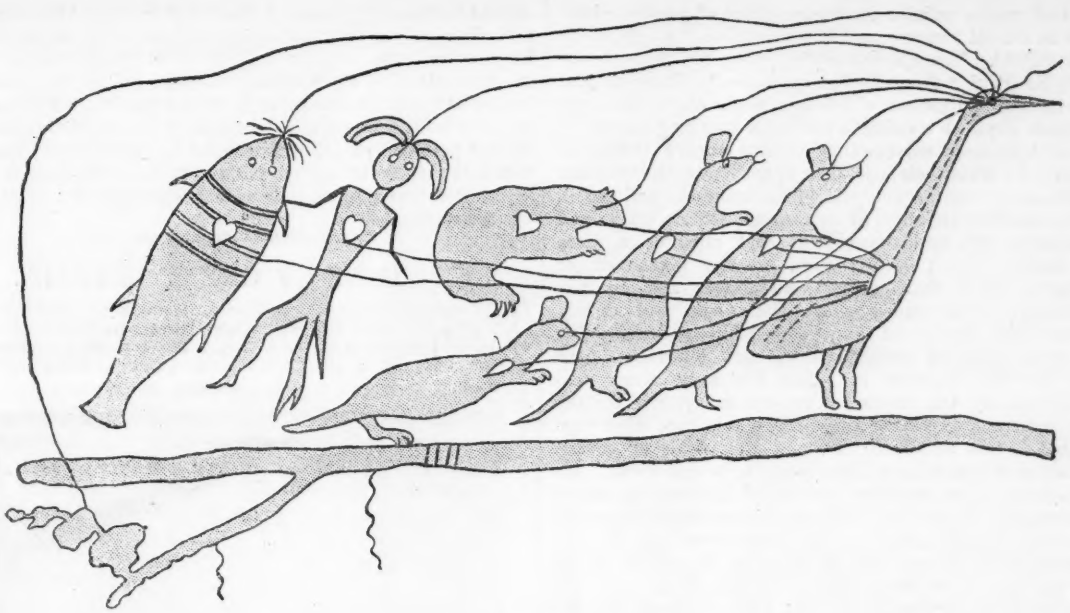


Fig. 1.

Griffins, may hold within themselves traces of the totem name of the horse, wolf, deer, raven, and that "animal fantasticall," the griffin. In Scotland we find the clan Chattan, or the wild cat; in Ireland "the men of Osory were called by a name signifying the wild red deer." On the other hand such names may have been given merely as nicknames (*i.e.*, ekename or the *added* name, from *eke*, "also," or "to augment"), suggested by the physical or mental likeness to the thing after which they are called.

But it is time to turn to the religious significance of the totem, as shown among races worshipping the animal which is their supposed ancestor.

At first glance this seems strong argument in support of Mr. Herbert Spencer's theory that all forms of religion (and all myth) have their origin in ancestor worship. The mysterious power of stimulation, of excitation to frenzy, or of healing and soothing, or of poisoning, which certain plants possess, has been attributed to indwelling spirits, which, as Mr. Spencer contends, are regarded as human and ancestral. Very many illustrations of this occur, as, *e.g.*, the worship of the Soma plant, and its promotion as a deity among the Aryans; the use of tobacco in religious ceremonies among the tribes of both Americas; whilst now and again we find plants as totems. The Pueblos have a tribe called the tobacco-plant, and also one called the red grass. One of the Peruvian Incas was called after the native name of the tobacco-plant; and among the Ojibways the buffalo grass was carried as a charm, and its god said to cause madness. Its manlike character is seen in the accompanying picture (Fig. 2.)

The worship of animals is on the like theory explained as due to the giving of a nick-name of some beast or bird to a remote ancestor, the belief arising in course of time that such animal was the actual progenitor, hence its worship. We call a man a bear, a pig, or a vampire, in symbolic phrase, and the figure of speech remains a figure of speech with us. But the savage loses the metaphor and it crystallises into hard matter-of-fact. So the traditions have grown, and Black Eagle, Strong Buffalo, Big Owl, Tortoise, &c., take the shape of the actual forefathers of the tribe having their name and crest. According to the same theory, the adoration of sun, moon, and mountains, &c., is due to a like source. Some famous chief was called the

Fig. 2.

Sun; the metaphor was forgotten; the personal and concrete, as the more easily apprehended, remained; hence, worship of the powers of nature "is a form of ancestor-worship, which has lost in a still greater degree the character of the original."*

The objection raised in former papers of this series to the extreme applicaion of the solar theory applies, so it seems to me, with equal force to Mr. Spencer's limitation of the origin of myth and religion to one source. Having cleared Scylla, we must not dash against Charybdis. Religion has its origin neither in fear of ghosts, as Mr. Spencer's theory assumes nor in a perception of the Infinite inherent in man, as Professor Max Müller holds. Rather does it lie in man's

* "Principles of Sociology," p. 413.

sense of vague wonder in the presence of powers whose force he cannot measure, and his expressions towards which are manifold. There is underlying unity, but there are, to quote St. Paul, "diversities of operation." There is just that surface unlikeness which one might expect from the different physical conditions and their resulting variety of subtle influences surrounding various races; influences shaping for them their gods, their upper and nether worlds; influences of climate and soil which made the hell of volcanic countries an abyss of sulphurous, stifling smoke and everlasting fire, and the hell of cold climates a place of deathly frost; which gave to the giant-gods of northern zones their rugged awfulness, and to the goddesses of the sunny south their soft and stately grace. The theory of ancestor-worship as the basis of every form of religion does not allow sufficient play for the vagaries in which the same thing will be dressed by the barbaric fear and fancy, nor for the imagination as a creative force in the primitive mind even at that lowest at which we know it. And, of course, beyond that lowest lies a lower never to be fathomed. We are apt to talk of primitive man as if his representatives were with us in the black fellows who are at the bottom of the scale, forgetting that during unnumbered ages he was a brute in everything but the capacity by which at last the ape and tiger were subdued within him. Of the beginnings of his *thought* we can know nothing, but the fantastic forms in which it is first manifest compel us to regard him as a being whose feelings were uncurbed by reason. That ancestor-worship is one mode among others of man's attitude towards the awe-begetting, mystery-inspiring universe, none can deny. That his earliest temples, as defined sacred spots, were tombs; that he prayed to his dead dear ones, or his dead feared ones, as the case might be, is admitted. From its strong personal character, ancestor-worship was, without doubt, one of the earliest expressions of man's attitude before the world which his fancy filled with spirits. It flourishes among barbarous races to-day; it was the prominent feature of the old Aryan religion; it has entered into Christian practice in the worship of saints, and perhaps the only feature of religion which the modern Frenchman has retained is the *culte des morts*. That it was a part of the belief of the Emperor Napoleon III. the following extract from his will shows:—"We must remember that those we love look down upon us from heaven and protect us. It is the soul of my great Uncle which has always guided and supported me. Thus will it be with my son also if he proves worthy of his name."

But the worship of ancestors is not primal. The remarks in my former paper on the late recognition of kinship by savages, among whom some rude form of religion existed, tell against it as the earliest mode of worship. Moreover, nature is bigger than man, and this he was not slow to feel. Even if it be conceded that sun-myth and sun-worship once arose through the nick-naming of an ancestor as the Sun, we must take into account the force of that imagination which enabled the unconscious myth-maker, or creed-maker, to credit the moving orbs of heaven with personal life and will. The faculty which could do that might well express itself in awe-struck forms without intruding the ancestral ghost. Further, the records of the classic religions, themselves preserving many traces of a primitive nature-worship, point to an adoration of the greatness and bounty, as well as to a sense of the maleficent and fateful, in earth and heaven which seem prior to the more concrete worship of forefathers and chieftains.

If for the worship of these last we substitute a general worship of spirits, there seems little left on which to differ. As aid to the explanation of the belief in animal ancestors and their subsequent deification and worship, as of the lion, the bull, the serpent, &c., we have always present in the barbaric mind the tendency to credit living things, and indeed lifeless, but moving ones, with a passion, a will, and a power to help or harm immeasurably greater than man's. This is part and parcel of that belief in spirits everywhere, which is the key to savage philosophy, and the growth of which is fostered by such secondary causes as the worship of ancestors.

SUN-VIEWS OF GREAT BRITAIN.

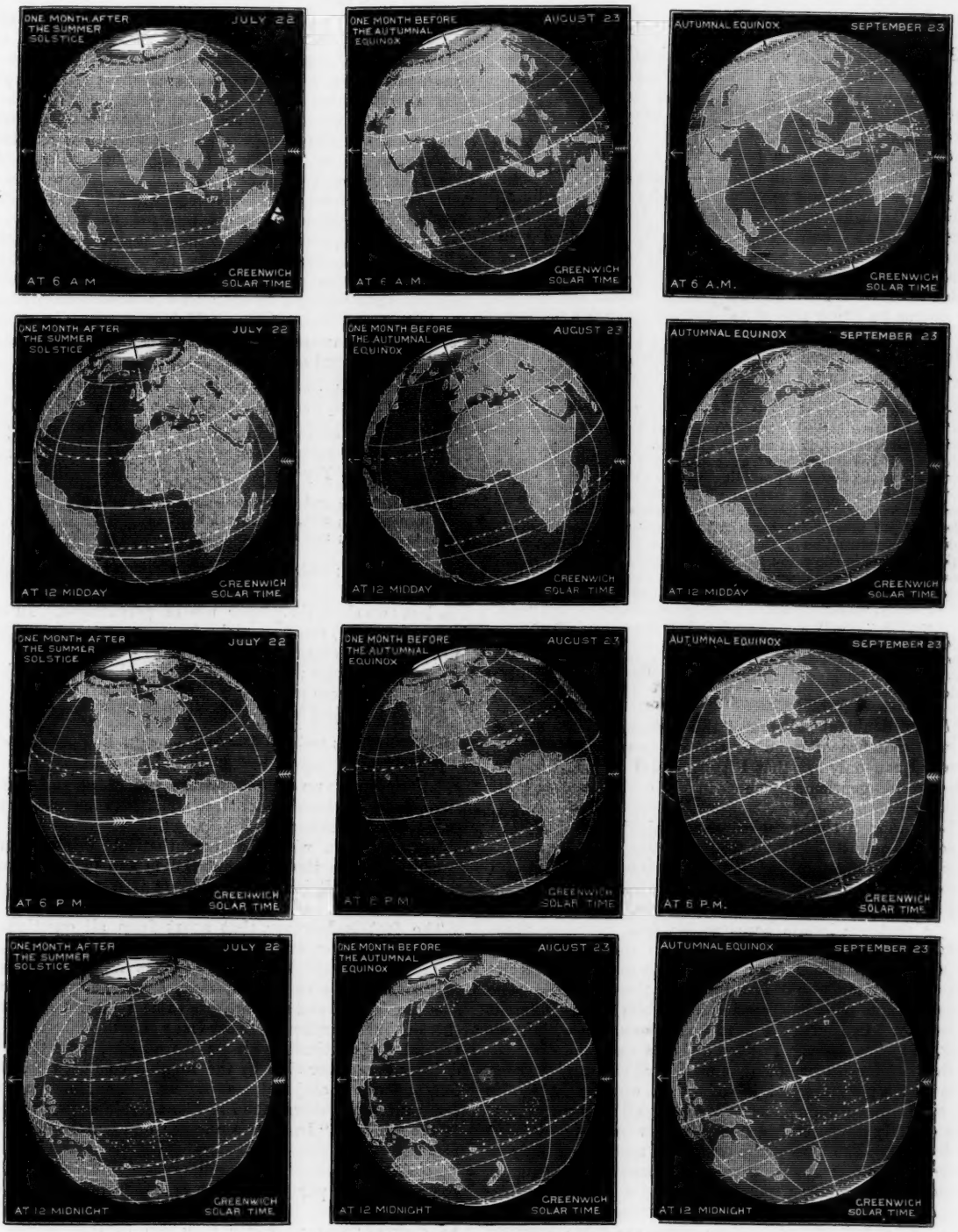
THE aspect of Great Britain, France, Denmark, &c., as supposed to be seen from the sun at noon (Greenwich time), at this season of the year is shown in Fig. 2, Fig. 1 showing the aspect those regions had at noon in midsummer, and Fig. 3 showing the aspect they will have at noon in midwinter.

Fig. 1. At noon, Midsummer (Greenwich time).

Fig. 2. At noon, in Spring or Autumn (Greenwich time).

Fig. 3. At noon, Midwinter (Greenwich time).

ONE MONTH AFTER SUMMER SOLSTICE. | ONE MONTH BEFORE AUTUMNAL EQUINOX. | AT THE AUTUMNAL EQUINOX.



SUN VIEWS OF THE EARTH;

OR, "THE SEASONS ILLUSTRATED."

By Richard A. Proctor.

I GIVE this week the Sun Views for the month, showing the aspect of the earth as supposed to be seen from the sun at six in the morning, noon, six in the evening, and midnight, Greenwich solar time, at the autumnal equinox. For comparison, the Sun Views for July and August are repeated.

XUM

NOTES ON PUNCTUATION.

By Richard A. Proctor.

THE *Brighton Herald* contends zealously for the rights of the humble comma, though now somewhat changing the figure by speaking of the comma as a humble but willing soldier, always ready to do its duty. The *Herald* is with us so far as the appearance of the comma before "who" or "which," when not wanted there, is concerned. A recent example has illustrated the mischievous effect of such excess of zeal on the part of the humble but willing soldier. Writing of "the Brighton Liberals who met yesterday, &c.," the *Herald* found a Conservative contemporary had altered the meaning of the words by pressing a humble soldier in before the "who."

But the *Herald* maintains its position about the use of the comma on either side of "therefore," in such a sentence as, "He called for help; and therefore I struck him," which the *Herald* writer would punctuate, "He called for help; and, therefore, I struck him." He reasons thus:—

> Our position, and we think it a strong one, is that the "therefore" is a parenthetical introduction, quite independent of the "and," which, indeed, it in no way qualifies. The "and" is the conjunction," the "therefore" an explanatory allusion, not to the "and" but to the sentence preceding it. Mr Proctor thinks that if the "and" were omitted, no one would think of adding a comma after "therefore." Possibly not, though even that is an open issue; but we must point out that the omission of the "and" implies a re-construction of the sentence, and, therefore, that what would hold good in one case need not necessarily be held to be bad because it does not hold good in the other. The same remark will apply to Mr Proctor's other illustrations. After reading the article very carefully, we cannot adopt Mr Proctor's contention that "and, therefore," is "simply monstrous," and we are afraid that we shall persist in the "absurdity which no good writer ever allows to remain, if he can possibly help it." How many well-intentioned gentlemen who imagine themselves to be "good writers" will this sentence shock!

[I am doubtful whether "this sentence" means the quoted sentence of mine or the whole sentence: if the former I can only say that I had no wish to shock "well-intentioned gentlemen who imagine themselves good writers."]

Now though the question thus raised is not a very important one it illustrates well the general principles involved in punctuation. Here is a writer who, after careful study of the matter, arrives at the conclusion that certain commas are necessary or at least desirable soldiers in a simple sentence, while here (at his desk perusing these words) is another who considers them simply monstrous, or at least described them so when he supposed that no practised writer would stand up for them, after a little consideration of what appeared to him their inherent absurdity. Of course the word "monstrous" is withdrawn now, out of courtesy. But my objections remain.

Suppose for a moment that we regard the word "therefore" as a parenthetical introduction, would that justify its enclosure between commas? Not at all; for "commas" are entirely different from parentheses in their meaning and effect. The best proof of this is that there may be three or five commas in a correctly punctuated sentence, whereas parentheses always come in pairs. Thus consider the sentence "He insulted me; and, therefore, I struck him, but not violently." Here there are three commas, the two first put in according to the *Herald's* plan and the compositor's constant rule, the third manifestly necessary. Where now is the parenthetical introduction? Is it the word "therefore," or is it the statement "I struck him"? If commas and parentheses were interchangeable it might as well be one as the other; in other words, the sentence, judged by the *Herald's* way of treating commas, bears more meanings than one.

But again, (which compositors nearly always change into But, again,) suppose we write "and (therefore)," or "and, therefore," agreeing to regard the commas as parentheses, what have we done by thus carefully nursing our parenthetical introduction? Have we helped the sense? Have we made it clearer than it was before that the word "therefore" relates to the preceding sentence. On the contrary, so far as we have done anything besides cumbering the sentence, we have made it appear that the word "therefore" relates specially to the "and"; for a parenthetical introduction is always referred to what immediately precedes, or belongs specially to the place where it is brought in. (In this indeed consists the whole art of using parentheses properly). Apart from the logical pressure thus brought to bear on the unfortunate little "and," consider the pressure which falls on it from the mere effect of pausing before and after the word "therefore." Read aloud successively,—

> He called for help; and therefore I went to him,
> He called for help; and, therefore, I went to him,

making in each case a proper pause for each stop, and the absurdity of the commas attending on therefore becomes at once apparent. Try these sentences again,—

> He insulted me; and therefore I went away,
> He insulted me; and, therefore, I went away,
> He insulted me; and therefore (not wishing to make a scene) I went away,
> He insulted me; and, therefore, (not wishing to make a scene) I went away.

The last two show the proper use of parentheses. In the former (of these) commas might have been used in accordance with the custom which allows them sometimes to replace parentheses; but parentheses are better, since they interrupt the sense less.

Some who object to parentheses altogether, would prefer

> He insulted me; and therefore I went away: for I did not wish to make a scene.

But there can be no doubt that the use of parentheses in such cases as these diminishes what may be called the mental friction in reading.

In connection with the parenthetical value of the comma, examine the first sentence in the passage quoted above from the *Brighton Herald*. It is a curiosity in its way.

The fact is, however, that apart from all questions of logic, punctuation, and so forth, the spirit of our language, I may say the spirit of language, rejects altogether the idea that such words as *so*, *yet*, *thus*, *hence*, *therefore*, *again*, *however*, *indeed*, and the like, are to be regarded as parenthetical introductions. They may be described as adverbial conjunctions, with no more right, usually, to be defended on either side by the humble comma, than *and*, *but*, and other conjunctions possess. Sometimes commas are wanted, however. The *Brighton Herald* cannot see why in the sentence "In quite a number of cases however the commas are better omitted" I leave "however" alone, while in the sentence, "Here, however, these is room for the practice" I put a comma on each side of the word. I had good reasons. In the first sentence the commas could be omitted; and whenever they can be they should be: nothing is more suggestive of inexperience in writing than failing to throw overboard every comma which can be spared. In the other case, putting in the commas threw the emphasis on "here," which was what I wanted.

There is a very just objection to the unnecessary or too frequent use of parentheses, but the feeling against them

is with many a mere prejudice. The proper rules for parentheses and the use of the dash, are, Use them when by so doing you diminish distraction, Avoid them when their use increases distraction. (I speak of diminishing and increasing distraction; for there is always some distractive effect in written matter.) I use parentheses freely, and some imagine that this results from over-quick writing, matters being thrown in between parentheses as a sentence runs on, which, had I written more slowly, would have come into a separate sentence. This is not the case. On the contrary, I am often at the pains to put within parentheses afterwards, matter which I had originally put by itself, judging (wrongly sometimes, mayhap, but still always after reflection) that the attention of the reader would be less distracted if a part of my reasoning came in as a passing thought, than if it were formulated separately after the break of a full stop. The passage between parentheses in the last sentence is a case in point: I wanted to show that I did not claim to be always right in opinions formed about parenthetical passages; but I did not deem it well to make such a remark separately after my sentence was finished, so I threw it in where it was wanted and where it would receive as much attention as it needed and no more.

With regard to colons and semicolons, I must say I differ from Sir Edmund Beckett. If there are any two "points" about whose use I never feel any doubt, the colon and the semicolon are the two. Apart from the work of the point-pepperer, who may have marred my intentions, I may confidently say that in all I have written since I first penned a line for publication—now just twenty years since—there is not a single colon which I would willingly see changed into a semicolon, or *vice versâ*. My own particular rule on that head is simply that a colon only should be used to separate complete sentences, which would be separated by a full stop were it not that you wish to indicate some connection between them,—as for instance that they both relate to the same subject, that subject not being the subject of the paragraph itself in which the colon-divided double sentence appears. (See the last sentence in the preceding paragraph, and also the last sentence in the next.)

The writer in the *Brighton Herald* objects to my theory that we should be economical of the comma; for he says it is wanted in long sentences though it may be spared in shorter ones. He has not quite apprehended my argument. It is precisely because the comma is so useful in long and involved sentences that we should economise it. In a short sentence we can throw in commas without fear of anything but distraction to the reader: in long sentences if we use the comma before it is wanted we are left without resource, save the too cumbrous semicolon, when the time of real need arrives.

I may in conclusion mention what I think some of my readers may be interested to learn. Twenty years ago, as I have said, I began to write. I was moved by a strong desire to give a clear and popular explanation of Doppler's Theory of the Colours of Double Stars, by which I had been much interested. I found myself so hard to satisfy, so far as forms of expression were concerned, that to write an article of nine pages I took about two months, writing sometimes only three or four lines a day. The article appeared in the *Cornhill Magazine* for December, 1863. Later (in 1864) when I was writing my book on Saturn, I still had so much difficulty in writing to my own satisfaction, that I would retain in my mind the reasoning of a whole chapter rather than begin the work of committing it to paper. I remember that when some delay occurred about the printing of the long and difficult chapter on "The Great Inequality," I imagined the printers must have lost the MS., and I wrote to tell them that I could replace the chapter, if they told me of the loss in time, knowing the whole of it by heart,—so laboured had been its production. It may be noticed by those who possess the first edition that there is but one passage, from beginning to end of the book, where any attempt is made at poetical description. That is in the concluding paragraph of Chapter III.; and though my mind was overflowing with thoughts of the beauties of the ringed planet, my pen refused to transcribe more than six lines. I went to school as a writer under a severe taskmaster—myself.

SEA ANEMONES

AT THE FISHERIES EXHIBITION.

By Thomas Kimber.

IV.—THE DAISY.

Actinia bellis (Ellis and Solander.) *Actinia pedunculata* (Pennant.)

ACTINIA BELLIS in contour is very much like a daisy, but bears no resemblance to one in colouring. This anemone is highly valued by collectors, partly for its own sake and also because it is not easily obtained in good condition, on account of its habit of ensconcing itself in crevices and holes. When, therefore, the difficulty of capture has been overcome and a perfect specimen is secured, it is very much esteemed. In addition to which, when once settled in a tank or vase Daisy is almost invariably in full bloom, it is also very hardy and easily kept in health.

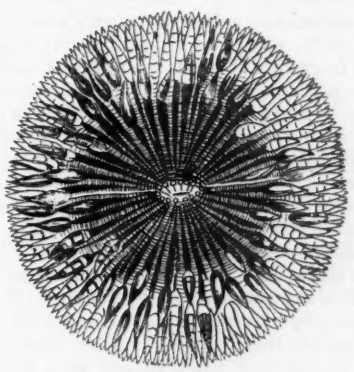


Fig 1. *The Bloom or Flower.*—The general surface of the disc is a horizontal plane, though in some instances it is slightly concave. The ordinary appearance of this anemone is fairly described as that of a saucer set upon a slender pedestal. The edge of the calyx is usually circular but sometimes it is frilled like a half-opened flower, and then has the appearance of being lobed.

The tentacles, arranged in about six rows, are inclined towards the centre or nearly erect in the inner row, and are much longer than those in the other rows. The total number of them in the six rows is estimated at about 500, arranged as follows, beginning with the innermost, $12+12+24+48+96+288=480$. The gonidal radii are frequently strongly marked, and in fine specimens this marking is extended by two tentacles, one on the side opposite to the other, which are larger by one third than any of the others, and not mottled like them, but of uniform colour, either cream-white or ochre. In some in-

dividuals there is only a single radius and one tentacle of this character, and in others there is no trace of either. The lips are rather thin and minutely furrowed.

There are two principal varieties of bellis, distinguished by the colour of its disk—one a dark chocolate brown, closely and evenly striped with bright scarlet, radiating from the centre to the edge. The lip in this variety is tinged with violet, and the tentacles are of a rich brown colour, relieved with blue-grey and opaque white.

The other variety is of a tamer brown, in several shades, relieved with grey and opaque white, and occasionally enlivened with light blue tints. There is a good coloured representation of this variety—disk, column, and button—in Gosse's "Rambles on the Devonshire Coast," p. 28, pl. 1.

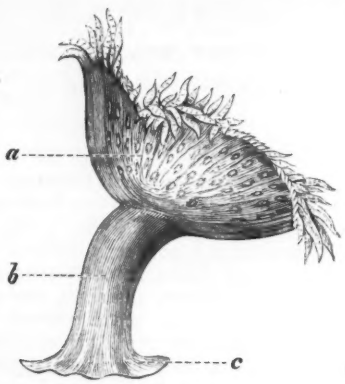


Fig. 2. *The calyx, &c.*—The calyx and the upper half of the pedunculus—*i.e.*, the stem—are studded with the whitish protuberances called warts, which are suckers. To these ordinarily, when the animal is first captured, sand-grains and fragments of shells are attached, and effectually conceal the parts so covered. When unobscured, the calyx is found to be grey, inclining to blue, which is toned down along the stem to whitish brown, and not unfrequently to a beautiful pink. The foot is invariably expanded, and very irregular in its outline.

The figure is extremely variable, and some curious examples of its variations are given in Dr. Johnston's "British Zoophytes," 2nd edition, p. 231. Within the space of a single hour Bellis will present a great variety of shapes. This Protean mutability of form is effected in two ways. First, by distension of the body with water until it nearly equals the disk in diameter; and, in the next place, by constricting itself in one part and constantly moving the position of this constriction.

When extended to the utmost limit the stem is slender and perfectly cylindrical.

Bellis is usually found in clusters of at least four or five individuals in each cluster, and crowded together in the same crevices or fissures, where their expanded disks press upon each other and form a continuous row of flower-like bodies.

Cornwall is called the metropolis of the English species. In Mount's Bay and along the Cornish coast daisy is the commonest of its genus. It is a littoral dwelling animal, and seldom met with except between tidal limits. Mr. Cocks (Johnston *ut supra*) points out that pretty Daisy will sometimes forsake those "wells of pure water"—the tidal pools—for what he describes as little better than a Stygian bog. "I found the beach," he writes, "composed of mud, sand, and decomposed algæ; many of the stones when lifted presented a face as black as the skin of an African, and sent forth a rich aroma of sulphuretted hydrogen. In turning the stones over, I was astonished to find in this Pandorian locality herds of the Actinia bellis in prime condition—jackets as red as a Kentish cherry—tubercles on external portion of the disk, light neutral tint, and strongly marked—so pugnacious that, when touched, water issued in full streams from nearly all the ducts or apertures. The ground is literally covered with them. The oral disk and the tentacula present a variety of tints—dark brown, light fawn, dark and light ochre, cream, &c.; all the tentacula (one excepted) are annulated. Each individual (I have fourteen in my bottles) has the ochre-coloured or white tentaculum—nearly one-third larger than any of the others—making one of the central row; and a white or buff mark, or line, extends from it to the angle of the mouth on each side."

Bellis is almost invariably stationary, rarely quitting its home or corner to which it has once become attached. Besides being able to produce the convolutions of calyx and peduncle, already described, it occasionally projects its disk and lips, which movement is called pouting, and it can retract completely both tentacles and disk when it appears in button form.

A curious habit, through not peculiar to Daisy, is thus described by Mr. E. W. H. Wordsworth:—"I have seen the elongation of one of the tentacles of the first row in Bellis. The ordinary shape and proportions were retained, but the arm was stretched to more than twice its natural length, yet without any appearance of unnatural tension or straining; it was constantly in motion, apparently feeling about for something, but assumed its usual size after a few hours."

Another observer noticed a tentacle on each extremity of the disk's diameter thrown out until the two together commanded an area of fully six inches in length by four in width. The space within this area was minutely examined by moving each tentacle in numerous circles and various elegant curves. The object of this singular movement was tested by placing a scrap of meat within reach of one of the elongated tentacles, when it was immediately seized and conveyed to the mouth.

(To be continued.)

JACK KETCH.

By Richard A. Proctor.

WHAT a pleasing effect the newspaper references to the "common hangman" are calculated to produce. Formerly, the subject was not considered very suitable for respectable papers. We could take up our *Times*, or *Daily News*, or *Standard*, with the assurance that, except in the accounts of executions, we should find no reference to the common hangman. Lately it has been different. One day we learned how the wretch who last held the office employed his leisure time; another day we were told how he had been allowed to visit the Houses of Parliament, and how among the 666 (or whatever the actual number) who represent the collective wisdom of our legislature, several showed marked attention to the degraded ruffian who had deliberately selected man-killing as part of the business of his life; next we hear of the details of his illness as if some great statesman or public benefactor were nearing his end; and now, with atrocious ill taste several of our daily papers (papers which may be laid each morning on the tables round which our wives and daughters sit) repeat the ghastly communications sent in by the murderous brutes who wish to be the next of our common hangmen! Truly those who provide matter for our journals are strangely

ill acquainted with the tastes of British readers; unless it is to be held that beneath a veneer of culture we have exceedingly coarse and savage tastes. Are we to suppose that in cock-fighting, bull-baiting, public prize fights, and other noble "sports" with which a "sentimental law-making" has interfered our innate savagery found a wholesome vent, and that now, wanting these, our people require to be supplied with "gallows news" to satisfy their hankering for what is savage and brutal? I fancy the leaders of public opinion (Heaven save the mark) might safely have credited us with better taste.

It may be urged that as we must have executioners so long as capital punishment is in vogue, the holder of the office ought not to be held in contempt, or regarded as necessarily a cruel and brutal wretch. There is, however, no *must* in the case. In America for the last half century there have been no "common hangmen" though capital punishment is still awarded and occasionally inflicted. On the Continent where there are executioners, their identity is concealed. No one in Great Britain was ever driven by want to take the office. The letters published so cheerfully in the public journals may at least serve a useful purpose in showing what manner of men hangmen are,—though this might have been guessed without so ghastly and degrading an exhibition.

As to the propriety of capital punishment, nothing need here be said. Taking the scientific view of the matter it may be noticed that Nature inflicts capital punishment relentlessly—if somewhat blindly—for less offences than those for which the law assigns the penalty of death. If there were no law for eliminating murderers from our midst they would be removed ere long without law; and systematic elimination is better than irregular removal. But in these days a more seemly system of capital punishment ought to be adopted.

Editorial Gossip.

A correspondent is exercised in his mind because at a recent meeting of the Astronomical Society certain doubts were raised respecting a point in the Lunar Theory. He tells me that a certain Mr. W. H. Phillips has devised "a new theory of a serpentine course of the moon" to which I ought, it seems, to have long since alluded. Mr. Phillips "says plainly," writes my correspondent, "that *your theory* and all astronomers *are wrong*, and that the Royal Astronomical Society had generously acknowledged his new discovery"—"so you see," he adds, referring to a former communication, "I am not mistaken in what he says about the Royal Astronomical Society owning to their being wrong in this matter of a Lunar Theory." This is not the first time that a discussion in the Astronomical Society about some matter far beyond the range of the general student, has been mistaken for an expression of doubt about an elementary matter. I remember that the late Mr. Reddie, paradoxist and founder of the Victoria Institute, was convinced that the Astronomical Society and the Astronomer Royal in particular, were coming round to his views, because Sir George Airy showed that the theory of the sun's proper motion in space was as yet by no means complete. Mr. Reddie had not the least idea what "the sun's proper motion in space" might mean; but he had ventilated some wild ideas about elementary astronomical matters and especially about the sun's fixity of position, so he immediately jumped at the conclusion that Sir George Airy had heard of these notions and was speaking of them. Now as a matter of fact Mr. Reddie's letters had long since found a place on the shelf which Sir George Airy had cruelly labelled,

"MY LUNATIC ASYLUM FOR LUNATICS."

It ought not to be necessary for me to explain that the doubts raised recently by Mr. Stone respecting the Lunar Acceleration have nothing whatever to do with the ordinary account given by astronomers respecting the moon's motion round the earth and (with her) round the sun. There never has been any doubt about this point since the Copernican theory was established,—and there never can be (that is, among astronomers). When astronomers speak of the Lunar Theory they do not refer to so elementary a matter as this; but to the mathematical analysis of those multitudinous perturbations which the moon's movements undergo, by which she is now swayed a little on this side now a little on that side, now a little above anon a little below, the course she would pursue if undisturbed in her combined elliptical paths around earth and sun. This course would differ little from an ellipse around the sun at one focus; for as Sir George Airy neatly put it (in a letter to Mr. Reddie) the moon may be regarded as a planet travelling around the sun but largely perturbed by the attractions of a neighbouring planet, the earth. The analysis of the other perturbations and of the constant fluctuations in the elements of the moon's apparent orbit round the earth, constitutes what is called the Lunar Theory, a subject which none but advanced mathematicians can hope thoroughly to grapple with, far less to deal with so as to advance our knowledge respecting it. The Differential and Integral Calculus is the A B C of the subject and of all kindred subjects. As we want to be a good deal beyond the A B C to read profitably, so must the mathematician be far beyond his first acquaintance with the "Dif-Cal" to follow the complex reasonings involved in the Lunar Theory.

Parts of the Lunar Theory remain still to be more fully explored than as yet they have been. Among these must be mentioned the Lunar Acceleration, that slight but measurable hastening of the moon in her course, by which she would not gain her whole apparent diameter in many centuries. It was supposed at the beginning of the present century that Laplace had explained this phenomenon fully, by his masterly analysis of the effect due to the gradual diminution in the eccentricity of the earth's orbit. But recently Professor Adams showed that when the analysis was carried somewhat farther half the acceleration remained still unaccounted for. After a long inquiry Adams' conclusions seemed established, and Delaunay suggested that the part of the acceleration unaccounted for might be apparent only, the real change being a constant but slow retardation of the earth's rotation; and he pointed to the tidal wave as capable of retarding the earth's rotation, though whether in sufficient degree to account for the estimated change, he could not say. And now further inquiry by Mr. Stone, Radcliffe Observer, indicates the probability that with further and deeper analysis the Lunar Theory may be able to account for the whole acceleration after all, without our having to assume any measurable retardation of the earth's rotation. Yet retardation of terrestrial rotation is doubtless taking place all the time.

The Delaunay mentioned in the preceding paragraph must not be confounded with the Delaunay who has ventilated absurd theories about the influence of the

planets in producing earthquakes. The latter, Captain Delaunay, made a happy hit in predicting a great terrestrial disturbance within two days of the time of the Javan earthquake. But a dozen such coincidences would not establish a theory so preposterous. As M. Faye said, commenting on Captain Delaunay's ideas, nothing is more certain in science than that the influence of the planets on terrestrial phenomena is *nil*.

Reviews.

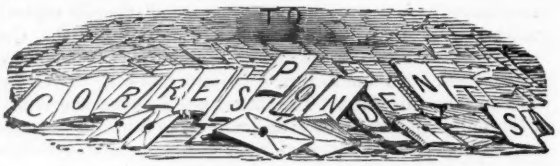
OUR AMERICAN COUSINS.*

WE have read many books about America, books meant to be brilliant, witty, humorous, profound, entertaining, and so forth; some meant to exhibit Americans as they are, others written to teach the Americans what they should be; books laudatory, and books scathing in denunciation. Here is a book which treats a subject one might suppose to be well worn, yet as full of freshness as though no one had ever yet written about America. There is no effort at effect, yet the account is thoroughly effective. We find here what a thoughtful Englishman, kindly but honest and just, has to say of that great nation which has grown on the other side of the Atlantic from European and chiefly from British blood. Mr. Adams has done thoroughly well what he sought to do, he has "presented a fair and accurate picture of so much of American life and American manners as came within his own observation." That there is much more of praise than of disapproval in this book proves the fairness of the writer; for no honest and intelligent Englishman can visit the United States without being impressed by the fact that in many most important matters, and especially in those which touch the dignity of manhood, the conditions there are more favourable than on this side of the Atlantic. But in his admiration for what is good Mr. Adams does not lose sight of less favourable conditions. He speaks plainly of what undoubtedly is the "rock ahead" for America, the readiness of Americans to suffer the control of affairs,—national government, state legislature, and civic administration, alike,—to be in the hands not of the best men, but of men who often are among the worst in the land. Because greedy and unprincipled men have grasped at power and wealth, the best men in America withdraw from politics, showing not true disinterestedness (though they *are* disinterested) but want of due interest in the welfare of city, State, and nation. Mr. Adams notes justly too one important cause of this—to wit, the unmeasured abuse poured by party papers in America (and what papers in America are not party papers?) on every candidate for office. With the certainty that however pure his motives, honest his zeal, and earnest his labours for his country's good, he will be abused by some if not most of the organs of public opinion as a scoundrel and a villain, the most patriotic American is apt to be deterred from the thought of giving his services to his country. The evil is deep-seated and affects the very life-blood of the nation.

We can say emphatically and truthfully of Mr. Adams's book that it is by far the best work of its kind we have yet seen. Reading it will correct many false impressions which Englishmen entertain respecting the great nation which their cousins have formed on the other side of the Atlantic. We do not agree with all that Mr. Adams says. (For instance, his love of freedom which we fully share, leads him to overlook, as it seems to us, the wrongdoings of those through whose action but against whose original intention, slavery was done away with.) But even his mistakes, or what appear to us as such, approve his fairness and justice. He presents throughout the facts as he sees them, and his insight is keen and true.

From this small and cheap work more may be learned about the real character of America and the Americans than from any book we have seen. We may add that the substance of Mr. Adams's book appeared originally in a series of articles contributed to that excellent weekly paper, the *Newcastle Weekly Chronicle*.

* "Our American Cousins": being Personal Impressions of the People and Institutions of the United States. By W. E. Adams. (Walter Scott: London).



"Let Knowledge grow from more to more."—Alfred Tennyson.

Only a small proportion of Letters received can possibly be inserted. Correspondents must not be offended, therefore, should their letters not appear.

All Editorial communications should be addressed to the Editor of Knowledge; *all Business communications to the* Publishers, *at the Office, 74, Great Queen-street, W.C.* If this is not attended to delays arise for which the Editor is not responsible.

All Remittances, Cheques, and Post Office Orders should be made payable to Messrs. Wyman & Sons.

The Editor is not responsible for the opinions of correspondents.

No communications are answered by post, even though stamped and directed envelope be enclosed.

VISUAL PHENOMENON; COLOURS OF FLOWERS; ERRATUM.

[934]—The phenomenon seen by Mr. Leonard Brown (letter 906) has been investigated by Mr. John Aitken, of Darroch, Falkirk. An account of his experiments will be found in the *Journal of Anatomy and Physiology*, for 1878 I believe; but as I have mislaid the author's copy which he kindly sent me, I am not sure as to date. No doubt, however, a letter on this subject sent by Mr. Brown to the above address would be courteously replied to.

For an experimental investigation of the colours of flowers, Mr. G. G. Hardingham may be referred to Dr. Sorby's paper on "Comparative Vegetable Chromatology" ("Proceedings of the Royal Society," No. 146, Vol. XXI., 1873). The paper is 41 pp. long, and cannot, therefore, be condensed into a paragraph. He confines his observations for the most part to colouring matters obtained from the leaves of the higher or the fronds of the lower classes of plants. I think, however, that Dr. Sorby would not undertake to say *how* colour is formed in flowers, inasmuch as he winds up his paper with this remark, "The storing up of the energy of the sun's rays in the various compounds formed by plants *is probably* so intimately connected with the optical and chemical properties of some of their coloured constituents, that the further extension of such inquiries as I have described may possibly assist in clearing up this very difficult and yet most important problem."

(On page 155, second column, line 5, for "ires" read "irises.")

William Ackroyd.

WART-CHARMING.

[935]—Apart from any superstitious credulity, I beg I may be allowed to entirely upset the "*simple explanation*" of "Mephisto" regarding Wart-Charming. An old gardener lived many years in our family. He was unlettered, but might be called "one of Nature's gentlemen." He was gifted with great imagination, and often, as children, we would listen with intense delight to him. He possessed the power of wart-charming. [Would one not rather say the power of impressing the minds of the warty ones?—R. P.] Brothers from school often applied to him for help in the cure of

these annoyances. I myself have shared in the effects of his mystic powers. The number of warts were given and faithfully counted by him in cutting notches on a stick. In strict secresy this stick was buried in the garden, [the gardener] uttering over it some charmed sentence, which no one was allowed to hear. The warts quickly vanished. A visitor in our family underwent the same treatment, with the same happy result. The warts were neither touched with saliva, or even looked at.

A CONSTANT READER OF "KNOWLEDGE."

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[936]—As a subscriber to your excellent paper, KNOWLEDGE, I saw (in No. 81, for May 18, 1883, amongst "Letters to the Editor") a very interesting article under the heading of "Wart Charming." If you will kindly allow me, I will offer an experience of my own with regard to warts, which you are at liberty to insert in your paper if you think it of any interest.

When I was a boy of about fourteen years of age I happened to have upon the back of my right hand three to four warts. One day a friend, happening to notice them, said that he would soon drive them away, and there and then told me what to do. Said he, "Next time you see a female dog, put something sweet over the warts and make the dog lick them, as long as you can over five minutes. I laughed, as I had a suspicion that the gentleman was making fun of me.

However, I thought I would prove the gentleman's method any way. So for three days after was on the look-out, when at last I fell in with an old schoolmate who had a little bitch along with him. Immediately I made friends with her and patted the animal on the head kindly; then I placed a few crumbs of biscuit (I happened to be munching at the time) upon the warts, and offered them to the dog. She ate them up greedily and licked the place over and over again, when I would put more crumbs on the warts; this kept her licking long over five minutes. Then I went home soon after and forgot all about the occurrence, when, lo! a few days after I was suddenly amazed to find the warts gone, but the place where they had been was visible for a little time after and then disappeared also. I can answer for the truth of this, and, as far I am able to understand it, it is, as you say, in some way influenced by the mind over the body, the attention being called towards them.

Yokohama, July 12, 1883. HENRY A. VINCENT.

[The case illustrates "Mephisto's" theory, which no doubt has an element of truth in it, though the mind influence theory is not overthrown or even shaken by it.—R. P.]

DEAF CATS.

[937]—R. S. T. (850) writes of a family of deaf cats, whose deafness he attributes to in-and-in breeding. I, too, have some acquaintance with deaf cats. The first I met was given to me as a very small kitten, in Syria, by a gentleman who told me it would grow up deaf, adding as a fact in natural history, that all white cats with blue eyes are deaf. I took my kitten to Malta, when in due time he developed into a deaf cat. At Malta I lodged in a house where my landlady possessed a family of three white Persian cats, all of whom were deaf; of course, for anything I knew to the contrary, in-and-in breeding may have been the cause in both cases, though certainly independently of each other, for my cat is not a Persian, and is like those belonging to my landlady only in colour. I may mention that my landlady is also acquainted with the quasi-physiological fact that white cats with blue eyes are invariably deaf.

I can answer for these animals not being deaf mutes, however. What a comfort it would be if this could be achieved by in-and-in breeding or any other means.

LETTERS RECEIVED, AND SHORT ANSWERS.

C. W. B. Yes; though your account is inexact, and your drawing, as you say, exaggerated. From the centre of whatever hemisphere of the earth is turned moonwards, a certain hemisphere of the moon is visible at any given moment; from points round the edge of that hemisphere of the earth, an observer can see a certain small distance beyond this hemisphere of the moon. The fringe of the moon's farther hemisphere thus brought into view, is about one degree of arc in breadth.—W. H. BANGALL, B.A. The subject is excellent and Mr. Allen would treat it admirably; but so many subjects are excellent, and he is admirably treating subjects of his own choosing.—J. A. R. Of course the principle of such tricks is obvious; yet they interest many.—H. F. F. H. I do not know how rain-water may be kept sweet in a large wine cask.—JAMES BURN. It is sad that none of the scientific contributors of the *Newcastle Weekly Chronicle* noticed your theory about the way in which the earth receives her heat. You have "formed the opinion that the rays of light when coming in contact with the atmosphere, after having passed through the frigid zone which encircles the globe either by an electrical or chemical action, lets loose the latent fire which the region of the air holds, as it were, in solution: by this means the earth will always have a sufficient supply of heat, and when it has done its duty it will again return to its aeral home." *I* have formed the opinion that I know no more than you do yourself what you mean. Try *this* theory:—The molecules of aqueous vapour supersaturated (as it were) with carbonic acid pass either by polar or magnetic action (so to speak) athwart the torrid zone which encircles the globe, and there bind the miasmatic emanations, which would otherwise pass away into the interplanetary æther; thus there is no waste, but (as one might say) a constant regeneration of (what may be called) the mundane heat fuel. "I trust I make myself understood."—H. PRICE. Whether, your eyesight being such as you describe it, at present, you will be able twenty years hence to see as well,—your age being now 30—I find myself unable to divine. I see as well now as I ever did in my life; but whether I shall be able to do so when I am fifty, I cannot say. How then can I tell you what your eyesight will be like a score of years hence.—ED. SHEPPARD. You take three digits, selected by A, B, and C, multiply A's, by 20 and add twice B's, then multiply the sum by 30 and add 6 times C's; dividing the sum by 6 you have the three digits. Well this is not very surprising. Your process gives you,—1°, six times C's digit; 2°, twice B's multiplied by 30, or 60 times B's; and 3°, 20 times A's multiplied by 30, *i.e.*, 600 times A's: therefore naturally, dividing by six, you have C's digit, 10 times B's, and 100 times A's; *i.e.*, A's in the hundreds' place, B's in the tens' place; and A C's in the units' place.—PHONOS. Know of no work that explains and teaches the thousand and one games that can be played with a pack of cards.

ERRATUM.—In the last line of Letter 926 (p. 173) 17·8″ E. of Greenwich should be 17·8 secs. (of time) E. of Greenwich.

Our Chess Column.

BY MEPHISTO.

SOLUTION.

PROBLEM No. 96, by J. BERGER, p. 160.

1. Q to R5	1. K to Kt4
2. B to Kt6	2. K moves
3. Q mates accordingly	

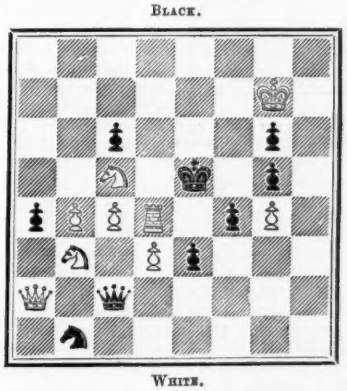
If 1. K to K6, 2. Q to K sq (ch), and 3. Q to Q2 mate; or if 1. P to K5, 2. Kt to Kt6 (ch), and 3. Q to K sq mate.

PROBLEM No. 99.

FOURTH PRIZE THREE-MOVER IN THE NUREMBERG PROBLEM TOURNAMENT.

BY J. BERGER, GRAZ.

BLACK.



WHITE.

White to play and mate in three moves.

(We shall be pleased if our solvers will institute a comparison between this problem and the first-prize three-mover in KNOWLEDGE,

No. 89, p. 33. We think such a comparison will result favourably to the above composition).

GAME PLAYED ON THE 30TH OF JULY, 1883, IN THE NUREMBERG INTERNATIONAL CHESS TOURNAMENT.

SCOTCH GAMBIT.

White. Blackburne.	Black. Gunsberg.	White. Blackburne.	Black. Gunsberg.
1. P to K4	P to K4	14. QR to B sq	K to R sq (*e*)
2. Kt to KB3	Kt to QB3	15. Kt to B4	Q to R2
3. P to Q4	P takes P	16. P to QKt4	P to B4 (*f*)
4. Kt takes P	B to B4	17. P to K5 (*g*)	P to Kt4 (*h*)
5. B to K3	Q to B3	18. P takes P	P takes Kt
6. P to QB3	KKt to K2	19. B takes P	P takes P (*i*)
7. Q to Q2	Kt takes Kt (*a*)	20. B takes P	B to Q2 (*j*)
8. P takes Kt	B to Kt3	21. R to K7 (*k*)	Q to Kt3
9. Kt to B3	P to KR3 (*b*)	22. R takes B	KR to Q sq
10. B to B4	P to Q3	23. B to K5 (ch)	Kt takes B
11. Castles K R	Kt to B3 (*c*)	24. P takes Kt	R takes R
12. Kt to Q5	Q to Kt3	25. Q takes R, and White won.	
13. KR to K sq (*d*)	Castles		

NOTES.

(*a*) This is incorrect, for it not only gives White a good centre position, but also loses time, as the Black Bishop is forced to retire to Kt3. Stronger play than this is 7. B takes Kt. 8. P takes Kt (If 8. B takes Kt, Q to Kt3), P to Q4. 9. P to Q5, Q to Kt3, with an even game.

(*b*) Loss of time. 11. Q to Kt3 would have been better, as it would have somewhat retarded White's development and taken the Q out of reach of the White QKt.

(*c*) White's development is much superior to Black's. White threatened the dangerous move of P to B4, to be followed by P to K5, &c., when Black's game would soon become untenable. Kt to B3 obviously prevents P to B4 for the present.

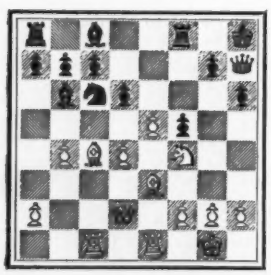
(*d*) Better than QR to K sq, for, as will be seen, the QR soon takes an active part in the game. P to B4 would not do, as Black could have replied with Q takes KP.

(*e*) B to Q2 instead would probably have been Black's safest course, as it would have enabled him to oppose the advance of White's centre by QR to K sq. It would have been bad to take the KP now, as White would obtain a winning attack, *i.e.*,

	14. Q takes KP
15. B takes P	15. Q takes QP
16. Q to Kt5 (threatening B takes KtP, &c.)	16. Q takes P (ch)
17. K to R sq	17. B to Q5
18. R to B sq	

and White should win by B takes P, following by Kt checking, &c.

(*f*) The move of B to Q2 would still have held good.



(*g*) A well-calculated move. By exchanging pieces Black could apparently win a P, but in reality he would lose, *i.e.*,

	P takes P
18. P takes P	Kt takes KP
19. B takes B	Kt takes B
20. R takes Kt	BP takes B
21. Q to Q6!	

and White should win.

(*h*) This is a very risky counter-attack, but Black had no satisfactory reply to the move of P to K5, the result of Black's prematurely playing P to B4, and delaying to develop his QB and QR.

(*i*) White has more than ample compensation for his piece in this interesting position. Black could not play B to Q2 on account of P to Kt5, which would win. The terrible check with the B on K5 wins the day for White, *i.e.*,

	19. B to Q2
20. P to Kt5	20. B to R4
21. Q to Kt2	21. B takes R
22. P takes Kt	22. Q to Kt3
23. P takes B	B to R4
24. P takes P, &c.	

(*j*) Black had to play all this under great pressure of time. R to Q sq seems stronger, but the nature of the position is such that White would have triumphed whatever Black played. White had three moves at his disposal in reply to R to Q sq, viz., (*a*) R to K7, or (*b*) P to Kt5, or B to B4, *i.e.*,

(*a*)	
	20. R to Q sq
21. R to K7	21. Q to Kt3
22. B to KB7	22. Q to Kt4

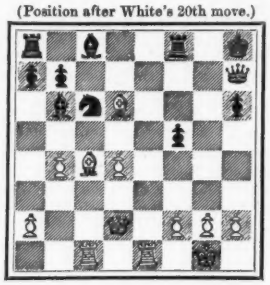
and we do not see any winning move for White; Black threatens both the R and the B. If White plays P to B4, Black could safely retire Q to Kt3. The best move for White in this position is probably 23. R takes Kt. Black obviously cannot take the Q, as White would mate in two moves by B checking and then B disc. ch. and mate, but Black would have a satisfactory reply in 23. P takes R. For if 24. B to K5 (ch), K to R2. 25. B to Kt6 (disc. ch.) (best), for 25. Q takes Q, P takes Q. 26. B to Q5 (ch), K to R3. 27. B takes P, B takes P. 28. B takes R, B takes B, and Black wins, as he threatens R to Q8). 25. K takes B (best). 26. R to Kt7 (ch), K to R4. 27. Q to K2 (ch), Q to Kt5. 28. R takes Q, P takes Q, and we do not see any immediate prospect of White winning (*b*).

	20. R to Qsq
21. P to Kt5	

With this move we think that White can force the game whatever Black plays, *i.e.*,

21. Q to Kt3 (best). 22. B to B4, B to R4. (If Kt to R4, then 23. R to K7, Kt takes B. 24. R takes Kt, B to K3. 25. B to K5 (ch), K to Kt sq. 26. R to B3, &c.)

(Position after White's 20th move.)



23. Q to K3	B takes R
24. R takes B	B to Q2

(If Kt to R4, then 25. Q to K7 wins.)

25. P takes Kt	B takes P
26. P to Q5	B to K sq
27. Q to Q4 (ch)	K to R2
28. R to K7 (ch)	B to B2
29. P to Q6	R to KB sq
30. P to Q7 (threatening B takes B, followed by P to Q8 (Q)	QR to Q sq
31. B to B7!	K to Kt sq
32. B takes B (ch)	R takes B
33. B takes R, and wins.	

If in the foregoing variation Black on his 22nd move plays Kt takes QP instead of B to R4, White would continue with 23. Q to Kt2; if then R to Q2, 24. R to B3, and White will soon obtain a winning advantage. Returning again to the position in the diagram, we find that, in reply to 21. P to Kt5, R takes B, can be played, but with similar unfavourable result, *i.e.*,

20.	R to Q sq
21. P to Kt5	R takes B
22. R to K8 (ch)	K to Kt2
23. P takes Kt, and White must win.	

(*k*) This move brings about a winning end game. P to Kt5 would also have won, but by a more complicated and difficult method.

ANSWERS TO CORRESPONDENTS.

*** *Please address Chess Editor.*

W. Furnival, G. W.—Problems received with thanks.

Correct solutions received:—Problem No. 96, G. W., W. Furnival. No. 97, W. Furnival, Schmucke, Warwick, John, W., G. W., Stettin. No. 98, Stettin, G. W., W., Warwick, Schmucke, W. Furnival, H. A. D.

H. A. D., in Prob. 97, if 1. B to B 8, P to B4, and there is no mate.

CONTENTS OF No. 98.

	PAGE
A Naturalist's Year. The Barn Owl Flies. By Grant Allen	161
Pleasant Hours with the Microscope. (*Illus.*) By H. J. Slack	162
The Harvest Moon. (*Illus.*) By R. A. Proctor	164
The Chemistry of Cookery. XVIII. By W. Mattieu Williams	165
The Morality of Happiness. By Thomas Foster	166
Evolution of Human Physiognomy. (*Illus.*) By E. D. Cope	168
Tricycles	169
Winds as Projectiles	170
Dangers of Sea Bathing	171
Editorial Gossip	171
Face of the Sky	172
Correspondence: The Bennett Battery — Small Wheels for Tricycles — A Curious Phenomenon—The Comma, &c.	173
Our Mathematical Column	175
Our Whist Column	176
Our Chess Column	176

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